I.E. 438 SYSTEM DYNAMICS / *QUIZ 1 (SOLUTION)* (07th of November, 2012)

PART 1. What is your name and surname?	**Signature**

PART 2. *Below are 10 questions covering the basic definitions of System Dynamics. There are five answers for each question. Although some of the answers may appear quite similar, you must select one and only one answer. Please circle the correct answer.* ***(3 points each)***

QUESTIONS

1. A system is an entity that maintains its existence through the mutual interaction of its parts. Which of the below is the key part of this definitions?

a) To be an entity.
b) To maintain its existence.
c) To form a unified pattern.
d) Mutual interaction of its parts.
e) None of the above.

2. Which of the below definitions **does not** best fit to the word "system"?

a) A system is an entity that maintains its existence through the mutual interaction of its parts.
b) A system is a heap or a lump.
c) An interdependent group of items forming a unified pattern.
d) The term *system* may refer to a set of rules that governs structure and/or behavior.
e) All of the above

3. Which one **is not** a general characteristic of the systems?

a) Systems consist of (definable) *elements*.
b) Between elements of a system there exist (mostly functional) *interrelations*.
c) Every system has a *boundary* to the surrounding "environment".
d) Systems often have a *dynamic behavior* over time.
e) Systems do not have structure, defined by components / elements and their composition.

4. Which one is not one of the four characteristic dimensions which are essential for the definition of system thinking?

a) Thinking in models.
b) Regulating systems.
c) Thinking in loops.
d) Dynamic thinking.
e) Steering systems.

5. A disciplined approach to systems thinking should consist of some proper steps. Which of the below **does not** best fit to the steps of systems thinking?

a) Simulate best possible scenario.
b) Define the situation.
c) Develop patterns of behavior.
d) Evolve underlying structure.
e) Identify the leverage points.

6. Who did create the System Dynamic methodology?

a) Prof. Dava NEWMAN.
b) Prof. Joseph SUSSMAN.
c) Dr. Afreen SIDDIQI.
d) Prof. Steven EPPINGER.
e) Dr. Jay W. FORRESTER.

7. What is the term dynamics refer to within the SD perspective?

a) Just Motion.
b) Freezing the time.
c) Change over time.
d) Real life.
e) All of the above.

8. What is the meaning of "Endogenous Perspective"?

a) Dynamic behavior that must be managed.

b) The dynamics which is caused by the internal feedback structure of the system.

c) Exponential growth

d) Some aspects of reality.

e) An engine/system that produces heat.

9. The most common definition of modeling is:

a) Predicting time and money.

b) A way of estimating any mathematical formulation.

c) A common scientific tool used in investigating problems and solutions.

d) A physical form of anything.

e) None of the above

10. A typical System Dynamics model can be:

a) Symbolic.

b) Descriptive.

c) Dynamic.

d) Continuous or discrete or hybrid.

e) All of the above.

PART 3. PLEASE FILL IN THE BLANKS

11. A _____ **feedback loop** exists when information resulting from some actions travels through a system and eventually returns in some form to its point of origin, potentially influencing future action(s). It is a closed sequence of causes and effects. ***(1 point)***

12. The main tools of SD are: ***(4 points)***

- _____ ***Causal Loop Diagram (CLD)***
- _____ ***Stock and Flow Diagram***
- _____ ***Model Equations***
- _____ ***Simulation***

13. _____ **System dynamics** is a methodology used to understand how systems change over time***. (1 point)***

14. The underlying relationships and connections between the components (elements) of a system is called the ____ **structure** of the system. ***(1 point)***

15. The structure creates the_____ **behavior. *(1 point)***

16. We have to mention NOT models of systems BUT models of _____ **selected aspects** of systems. ***(1 point)***

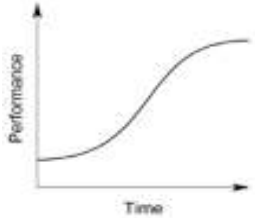
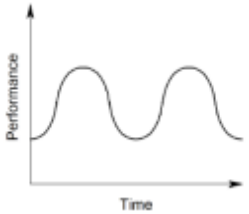
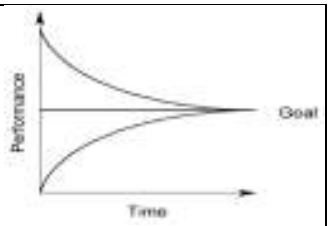
17. Defensive attitude is _____**unproductive**. ***(1 point)***

18. The main reasons of complexity of dynamic systems are: ***(4 points)***

- _____ ***Dynamics.***
- Feedback.
- _____ ***Non-linearity.***
- _____ ***Scale.***
- _____ ***Human dimension.***
- Cause and effect separated in time and space.
- Intuitive inadequacy.

19. The required mathematics is almost always _____**impossible** for large, non-linear dynamic feedback models. ***(1 point)***

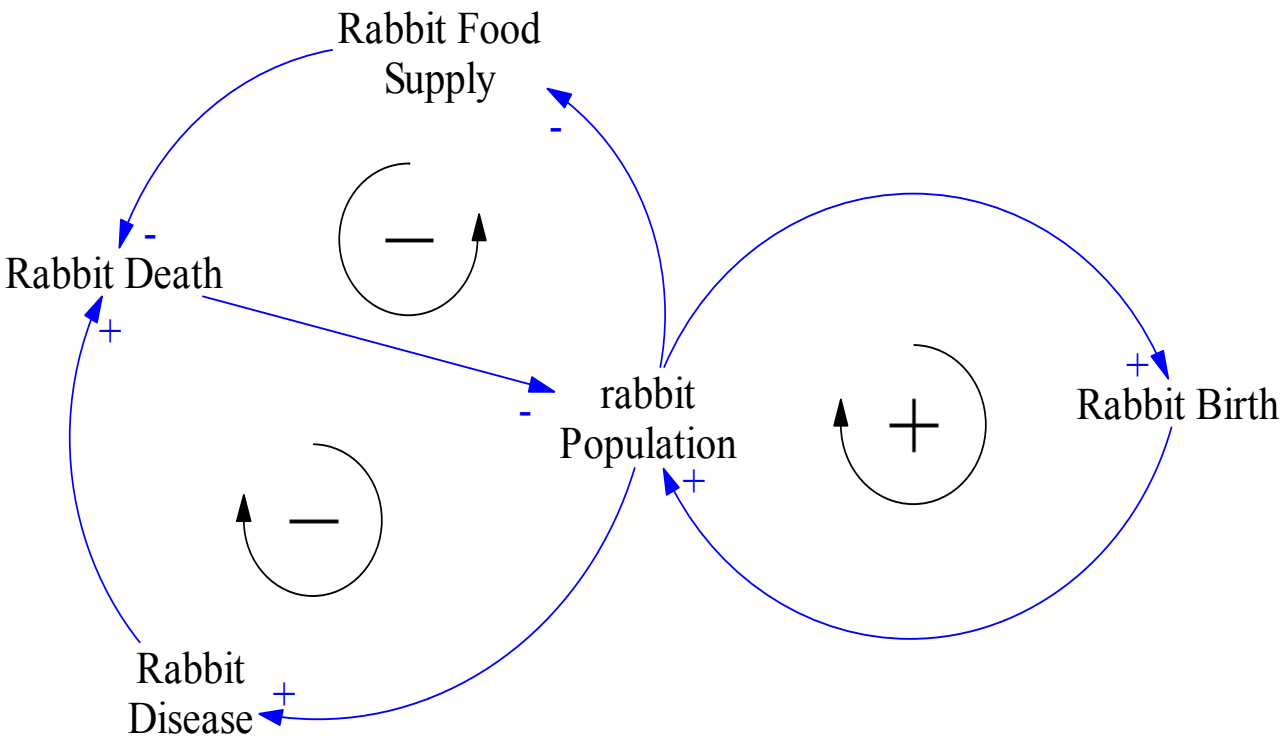
20. What are the generic names of four patterns of behavior shown below? ***(4 points)***

			
Exponential growth	***S-shaped***	***Oscillation***	***Goal-Seeking***

21. A causal link from one element A to another element B is _____ **positive** if either A adds to B or a change in A produces a change in B in the same direction. ***(1 point)***
22. A causal link from one element A to another element B is _____ **negative** if either A subtracts from B or a change in A produces a change in B in the opposite direction. ***(1 point)***
23. A positive feedback loop is also called as _____ **reinforcing** feedback loop. ***(1 point)***
24. A negative feedback loop is also called as _____ **balancing** feedback loop. ***(1 point)***
25. // sign on the link means _____ **delay**. ***(1 point)***
26. When positive and negative loops are combined, a variety of patterns are _____ **possible**. ***(1 point)***
27. A _____ **stock** is an accumulation of something over time. ***(1 point)***
28. A _____ **flow** is the movement or the rate of change of the something from one stock to another. ***(1 point)***
29. Flows only occur over a _____ **period of time**, not any particular instant. ***(1 point)***
30. The inflow and the outflow for the stock "Population" are: ***(2 points)***
    - _____ ***Births***
    - _____ ***Deaths***

PART 4. .

31. Please put the necessary signs on the causal link below. Then please, also specify the signs and types of the Feedback loops. ***(40 points)***



GOOD LUCK !